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PRINCIPAL INVESTIGATOR: Michael A. Pickering, PhD

CONTRACTING ORGANIZATION: Eastern Washington University
Cheney, WA 99004

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E-Mail: tpickering@ewu.edu

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668 N. Riverpoint BLVD
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14. ABSTRACT (same as 2015)

The purpose of this research project is to develop and validate a portfolio of self-report instruments capable of being used to assess various psychological attributes (e.g. skills, attitudes, beliefs) of military personnel, both within and across military contexts. A secondary aim is to demonstrate and disseminate an instrument development process to the military research psychology community, so that future research efforts may be enhanced through use of measurement tools supported by robust psychometric validity evidence. Specific constructs (psychological skills, mental toughness, resilience, cohesion, job engagement, ability beliefs, self-steem) were originally selected through discussions amongst project investigators and experienced military personnel. Most have appeared in military psychology research literature (E.g., Alarcon, Lyhons & Tartaglia, 2010; Chambel & Oliveira-Cruz, 2010; Hammermeister, Pickering & Ohlson, 2009; and Pickering et al., 2010). With the exception of cohesion, preliminary measurement models of all constructs have been developed and are ready to be subject to follow-up validation via new military data samples.

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
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Introduction

This report summarizes the progress made to date, on the Soldier Mental Fitness Psychological Construct Development Project. The primary purpose of this research project is to develop and validate a portfolio of self-report instruments capable of being used to assess various psychological attributes (e.g. skills, attitudes, beliefs) of military personnel, both within and across military contexts. A secondary aim is to demonstrate and disseminate an instrument development process to the military research psychology community, so that future research efforts may be enhanced through use of measurement tools supported by robust psychometric validity evidence. Specific constructs were originally selected through discussions amongst project investigators and experienced military personnel. Most have appeared in military psychology research literature (E.g., Alarcon, Lyhons & Tartaglia, 2010; Chambel & Oliveira-Cruz, 2010; Hammermeister, Pickering & Ohlson, 2009; and Pickering et al., 2010). The list of targeted constructs is as follows:

- Psychological skills (E.g., mental practice, attention control, confidence)
- Mental toughness
- Resilience**
- Cohesion
- Job engagement
- Soldier ability beliefs
- Self-esteem
- Coping Style**

**We have added both a second resilience construct, and now have initial measurement model validity evidence for both the Conner Davidson Resilience Scale and the Brief Resilience Scale. We also added adversity coping style as an additional psychological construct of interest.

Keywords

Methods and Statistics, Psychometrics, Construct Validation, Confirmatory Factor Analysis/SEM, Exploratory Factor Analysis, Resilience, Self-Esteem, Job Engagement, Cohesion, Ability Beliefs, Psychological Skills, Mental Toughness, Coping Style.

Accomplishments

Statement of Work Milestone Status

Milestone	Plan Date	Status/Notes
Draft/finalize IRB protocol (EXEMPT)- Submit to EWU for approval	6-Jan-15	Complete
Re-establish contacts, set up training schedule for visiting CSFF/sites	6-Jan-15	Contact complete, site visit schedule ongoing as of October 2016
Protocol approved by EWU, Submit to DOD for approval (target)	6-Jan-15	Complete
Protocol approved by DOD (target)	6-Jan-15	Complete
Draft/submit tech report/manuscript #1 (job engagement instrument)	6-Apr-15	Resilience Manuscript and Job Engagement manuscripts have been submitted; but not yet accepted. Mixed reviews on both. More than one editor has suggested concern that readership will prefer broader audience than military only. Working on re-working papers to include both military and non-military samples where possible.
Ongoing data acquisition through CSFF sites	6-Jul-15	Has been re-established as of October 2016
Draft/submit tech report/manuscript #2 (electronic vs. paper/pencil modality comparison)	6-Jul-15	Per above, manuscript #2 submitted but not yet accepted.
Draft/submit tech report/manuscript #3 (ability beliefs instrument)	22-Oct-15	Ability Beliefs manuscript still in progress; but now expanded to include multiple military and non-military data samples.
Draft/submit tech report/manuscript #4	6-Jan-16	Not yet submitted. Will be mental toughness. Cohesion data not yet obtained
Develop/print/distribute/collect survey versions to CSFF sites (ongoing)	6-Jan-16	Survey developed and distributed to sites as of October 2016
Future Milestones w/ Revised Target Dates via No Cost Extension		
Draft/submit tech report/manuscript #5 (resilience instrument)	New Target 6-Apr-17	2nd resilience instrument manuscript will be based on new BRS resilience scale suggested by Dr. Adler at 2016 IPR. New Soldier data currently being collected.
Complete data acquisition for all surveys/constructs	New Target 30-Apr-17	See narrative – still possible to meet this goal with collaboration with CSFF.
Draft/submit tech report/manuscript #6 - #10 (remaining instruments) and project final report.	21-Jun-17	Per 2015 annual report notes, no cost extension filed. Annual report to be submitted by June 21, 2017. Most manuscripts should be drafted by then.

Narrative

Progress during the past year (2016) has nudged forward, but been slow. As discussed in last year's annual report, and at the 2016 annual in-progress review, data collection efforts with CSF2 remained stalled for much of the year. Fortunately, as a result of discussions and interactions at the IPR meeting, it appears we have finally made some progress in re-initiating the data acquisition process. As of December 2016, new data has begun to trickle in from several CSF2 sites.

Based on the feedback from multiple from journal reviews, we have not submitted additional manuscripts since last year. Our initial two submissions (resilience and self-esteem) received some positive reviews; but editors were concerned that readership of their respective journals would be more interested in scales that exhibited psychometric validity evidence across both military and non-military populations. This is actually consistent with our own measurement philosophy in that ideally, the various instruments used in military settings will exhibit consistent psychometric properties across contexts and populations. Thus, where possible, effort is now underway to re-construct the manuscripts as multi-study papers. These will include measurement validity evidence from both military and non-military samples. The non-military samples are coming from other research projects, with permission from the study investigators.

During the past year we have received several inquiries regarding applied use of the instruments under development. As a result of these inquires I am in the process of developing guidelines for scoring and use of the self-report tools. One primary emphasis of these guidelines will be explanation and clarification that these scales are designed as research instruments; primarily aimed at assessing group differences, group level associations with other constructs, and perhaps, fuzzy assignment to attribute profile groups. The tools are not designed to be used as individual diagnostic, clinical, or screening devices. Cautious guidance and disclaimers will be offered to those desiring to use these tools for applied purposes. One over-arching message of guidance will be that these tools might serve as useful mechanisms for facilitating discussion; but seldom, if ever, be used for individual diagnostics or screening.

The first appendix (A) shows the revised survey now being used to obtain data for the initial round of instruments. Also included is a scoring key. The revised survey now includes items to assess mental toughness using the 3R-Mental Toughness Inventory (3RMTI: Pickering, 2016) and the Brief Resilience Scale (BRS: Smith, 2008). A second survey of comparable length will be finalized during February of 2017 for use beginning in March 2017.

Impact

It remains difficult to claim substantial impact of the project thus far, notwithstanding the inquiries for applied use by a few performance consultants and a select few researchers (Army and sport performance realms) of the scales mentioned above. For example, the 3RMTI has been included in two future Army study protocols, and a third inquiry has been received. Likewise, the job engagement scale has been used in a PhD dissertation, and is included in at least one upcoming Army study protocol.

Impact will be more tangible with dissemination of the new survey instruments and results from these initial uses are made available. Otherwise, nothing to report as of yet.

Changes/Problems

The primary change to the project is that we filed and gained approval of a no-cost extension, adjusting the project end-date to June 21, 2017.

In addition to the addition of the adversity copy styles inventory referred to in last year's report we have added a second resilience scale (BRS; Smith, 2008) to our assessment. This was done in response to feedback at the 2016 IPR meeting.

We are continuing to utilize data obtained from previously or alternatively from other studies to supplement new data obtained via CSF2. As mentioned in the first section of this report, we have finally begun obtaining new data from military samples to use in the second round of measurement validation.

The revived collaboration with CSF2, combined with the no-cost extension approval should allow us to complete the project, in original scope, by June 2017.

Products

No new formal dissemination products were produced in the past year. Per comments above, where possible, manuscripts are now being designed as multi-study papers, to meet editor comments suggesting most journals will prefer measurement validity evidence for both military and non-military samples.

An applied user guide is currently being developed in response to inquiry from applied (non-researchers) and researchers alike.

Previously submitted Manuscripts (full manuscripts provided in last year's report)

Pickering, M.A., Metzler, J., Dumer, A., Hammermeister, J., Wisnieski, S. & McGraw, L. (submitted - *under review as revise and re-submit*). Measuring self-reported resilience in soldiers: Multi-group longitudinal invariance of a revised 10-item Conner-Davidson Resilience Scale (CDRISC).

Pickering, M.A., Marino, C. & Start, A. (submitted - *under review*). Measuring multi-dimensional self-esteem in military healthcare providers: Development of a brief three-dimensional self-esteem rating scale.

Conference Presentations

Pickering, M.A., Start, A., Hammermeister, J., Flynn, C., Vezzani, M., & ConwayB., (2016). Assessing "3R" mental toughness:Student self-appraisals of coping with adversity. Guest lecture presented at the 2016 Annual Northwest Student Sport and Exercise Psychology Symposium (NWSSEPS), Cheney, WA.

Jensen, P.R., **Pickering, M.A**.,Hill, R., Turner, C.& Lorenzen, D.(2016) Mindsets, Coping, and Physical Performance: College Students' Implicit Beliefs About Ability Play A Role In Performance During A Combat-Sport Event. Lecture presented at the 2016 Annual National Convention of the Association of Applied Sport Psychology (AASP), Phoenix, AZ.

Pickering, M.A., (2016) Performance Psychology Research Relevant to Military Contexts. Guest lecture presented to Comprehensive Soldier and Family Fitness unit at Ft. Hood, TX.

Jensen P.R. & **Pickering, M.A.** (2015). Assessing psychological readiness and stress coping behaviors in U.S. Army Soldiers: Relationships with physical performance in hand-to-hand combat training (2015). Lecture presented at the 2015 Annual National Convention of the Association of Applied Sport Psychology (AASP), Indianapolis, IN.

Pickering, M.A. (2015). Conceptualizing Mental Toughness: What I'm learning from athletes, soldiers and cats. Keynote lecture presented at the 2015 Annual Northwest Student Sport and Exercise Psychology Symposium (NWSSEPS), Cheney, WA.

Other Briefings

Pickering, M.A. & Jensen, P.R. (2015) USMA Cadet Combatives Study: Year 1 Preliminary Findings. Briefing - United States Military Academy Center for Enhanced Performance.

Participants & Other Collaborating Organizations

Nothing to Report.

Special Reporting Requirements

Nothing to Report.

Appendices

Detailed appendices appear on following pages:

Measurement models that have not been adjusted since 2015 annual report have not been included.

Appendix A provides next data acquisition survey (revised).

Appendix B updates findings and displays the measurement model for a 12-item Mental Toughness Inventory (revised from 15-item model presented in last year's annual report).

Appendix C displays the measurement model, items and initial psychometric summary results for the Brief Resilience Scale.

Appendix C lists data sources used to arrive at preliminary measurement models thus far.

Appendix A. – Revised Survey for CSF2 Data Acquisition (includes items from 3RMTI & BRS scales)

Begins next page.

This revised version of the survey, now being distributed to CSF2 sites, includes the new Brief Resilience Scale (BRS, Smith et al 2008) and the 3R Mental Toughness Scale).

U.S. Army Self-Report Survey Improvement Questionnaire Version A

Dr. Michael Pickering, of Eastern Washington University, in collaboration with the CSF2 organization, and with the sponsorship of TATRC and the U.S. Army Medical Research and Materiel Command (MRMC), is requesting your volunteer participation in a research project aimed at improving the use of self-report measures (survey questionnaires) in U.S. Army studies.

Participation in this study involves completing the attached brief and anonymous survey. There are no additional responsibilities or expectations. The questionnaire is designed to take ten minutes or less to complete, and you will not be asked to provide any personally identifiable information.

There will be no special benefits, nor additional compensation afforded to you for participating.

The specific purpose of this study is to develop valid, short, survey tools for use in future military research. For example; in the past some questionnaires that investigators have used to assess self-perceptions of resilience have required Soldiers to respond to 25-40 questions. This study will identify specific survey questions that work best, so that future studies can use no more than 8-10 questions to obtain the same information.

Of course, <u>you are not required to participate.</u> You are being asked to participate in this study because the project cannot be completed without insights, input and responses from Soldiers like yourself; but, ***there are no penalties or ramifications if you choose not to complete the questionnaire****.*

By responding to items, you are granting permission to investigators to use your anonymous answers in our research. By regulation, representatives of the U.S. Army Medical Research and Materiel Command are authorized to review research records as part of their responsibility to protect human research volunteers. Research records will be stored in a confidential manner so as to protect the confidentiality of your information. ***Again, for this study, your responses will not be associated with your personal identity in any way.*** *If you do have any concerns about your rights as a participant in this research, or any complaints you wish to make, you may contact Ruth Galm, EWU Human Protection Administrator (509-359-6567), rgalm@ewu.edu.*

Survey Instructions

Please answer each item simply by placing a legible mark in each "bubble" that indicates how strongly you agree with the statement. For example, ANY of the following marks will work:

● (fill-in) X ("x") √ (checkmark)

If you do not want to answer a question, you may skip it.

Please place your completed questionnaire back in the manila envelope and return to the individual administering the survey. Remember, please do not put any personally identifiable information on the survey or the envelope. Your responses are completely anonymous.

Thank you for your participation and assistance with our research.

It is greatly appreciated!

Please indicate how strongly you agree with each statement by marking the appropriate bubble.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
1). I really put my heart into my job as a Soldier.	◯	◯	◯	◯	◯	◯	◯
2). I feel confident in my ability to learn new things.	◯	◯	◯	◯	◯	◯	◯
3). I avoid situations I expect will go poorly.	◯	◯	◯	◯	◯	◯	◯
4). We all have a certain level of Soldier ability, and we cannot really do much to change that level.	◯	◯	◯	◯	◯	◯	◯
5). I get excited when I perform well as a Soldier.	◯	◯	◯	◯	◯	◯	◯
6). When the going gets tough, I think more clearly.	◯	◯	◯	◯	◯	◯	◯
7). I feel that people really like to talk with me.	◯	◯	◯	◯	◯	◯	◯
8). To be successful as a Soldier you need to learn techniques and skills, and practice them regularly.	◯	◯	◯	◯	◯	◯	◯
9). After difficult events, I perform better in the future.	◯	◯	◯	◯	◯	◯	◯
10). When I get up in the morning I look forward to my day as a Soldier.	◯	◯	◯	◯	◯	◯	◯

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
11). I feel ashamed about myself.	◯	◯	◯	◯	◯	◯	◯
12). When I anticipate adversity I become easily distracted.	◯	◯	◯	◯	◯	◯	◯
13). Even if you try hard, your success as a Soldier will change very little.	◯	◯	◯	◯	◯	◯	◯
14). While performing my Soldier duties I typically work with full intensity.	◯	◯	◯	◯	◯	◯	◯
15). Performing under pressure brings out the best in me.	◯	◯	◯	◯	◯	◯	◯
16). I feel confident in my ability to cope with difficult situations.	◯	◯	◯	◯	◯	◯	◯
17). You need to have certain natural abilities to be a really good Soldier.	◯	◯	◯	◯	◯	◯	◯
18). I respond after failure by working at getting better.	◯	◯	◯	◯	◯	◯	◯
19). I feel responsible for my own performance as a Soldier.	◯	◯	◯	◯	◯	◯	◯
20).When I am with other people, I feel that they are glad I am with them.	◯	◯	◯	◯	◯	◯	◯

Please indicate how strongly you agree with each statement by marking the appropriate bubble.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
21). When I expect things to go wrong, I start to panic.	◯	◯	◯	◯	◯	◯	◯
22). You need to learn, and to work hard, to be good at being a Soldier.	◯	◯	◯	◯	◯	◯	◯
23). I find the work I do as a Soldier to be meaningful.	◯	◯	◯	◯	◯	◯	◯
24). During a crisis, I execute tasks even better.	◯	◯	◯	◯	◯	◯	◯
25). I feel inferior to other people.	◯	◯	◯	◯	◯	◯	◯
26). If you work hard at it, you will always get better at being a Soldier.	◯	◯	◯	◯	◯	◯	◯
27). Adversity teaches me how to improve.	◯	◯	◯	◯	◯	◯	◯
28). While executing my Soldier duties I typically exert maximum effort.	◯	◯	◯	◯	◯	◯	◯
29). I feel that I can count on myself to manage things well.	◯	◯	◯	◯	◯	◯	◯
30). The possibility of failure scares me.	◯	◯	◯	◯	◯	◯	◯

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
31). To be a good Soldier you need to be born with the basic qualities that will allow success.	◯	◯	◯	◯	◯	◯	◯
32). I am very committed to my job as a Soldier.	◯	◯	◯	◯	◯	◯	◯
33). Stress improves my focus on the task at hand.	◯	◯	◯	◯	◯	◯	◯
34). I feel that my friends find me interesting.	◯	◯	◯	◯	◯	◯	◯
35). To reach a high level of Soldier performance you need to go through periods of learning and training.	◯	◯	◯	◯	◯	◯	◯
36). After things go poorly, I attend to what matters most.	◯	◯	◯	◯	◯	◯	◯
37). My general attitude towards my Soldier responsibilities is usually enthusiastic.	◯	◯	◯	◯	◯	◯	◯
38). I get angry at myself over the way I am.	◯	◯	◯	◯	◯	◯	◯
39). I tend to bounce back quickly after hard times.	◯	◯	◯	◯	◯	◯	◯
40).How good you are at being a Soldier will always improve if you work at it.	◯	◯	◯	◯	◯	◯	◯

Please indicate how strongly you agree with each statement by marking the appropriate bubble.

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
41). I strive as hard as I can to complete my Soldier responsibilities.	◯	◯	◯	◯	◯	◯	◯
42). I have a hard time making it through stressful events.	◯	◯	◯	◯	◯	◯	◯
43). I feel confident that I can do well in whatever I do.	◯	◯	◯	◯	◯	◯	◯
44). It is difficult to change how good you are at being a Soldier.	◯	◯	◯	◯	◯	◯	◯
45). It does not take me long to recover from a stressful event.	◯	◯	◯	◯	◯	◯	◯
46). How well I do my job as a Soldier matters to me.	◯	◯	◯	◯	◯	◯	◯
47). I feel that people like me.	◯	◯	◯	◯	◯	◯	◯
48). It is hard for me to snap back when something happens.	◯	◯	◯	◯	◯	◯	◯
49). To be a good Soldier you need to be naturally gifted.	◯	◯	◯	◯	◯	◯	◯
50). My job as a Soldier is inspiring.	◯	◯	◯	◯	◯	◯	◯

	Strongly Disagree	Disagree	Somewhat Disagree	Neither Agree or Disagree	Somewhat Agree	Agree	Strongly Agree
51). I usually come through difficult times with little trouble.	◯	◯	◯	◯	◯	◯	◯
52). I do not like myself.	◯	◯	◯	◯	◯	◯	◯
53). You can always become a better Soldier if you put enough effort into it.	◯	◯	◯	◯	◯	◯	◯
54). I tend to take a long time to get over setbacks in my life.	◯	◯	◯	◯	◯	◯	◯

What is your gender? ◯ Male ◯ Female **What is your age?** _____(years) **How many children do you have?** _____

What is your ethnicity? ◯ Caucasian/White ◯ African American ◯ Hispanic ◯ Asian/Pacific Islander ◯ Other _____

What is the highest education level you have achieved? ◯ High School or GED ◯ Some College ◯ Associate's Degree ◯ bachelor's degree ◯ Master's degree ◯ Doctorate degree (PhD, EdD, etc.)

Appendix B. – Revised 12-item Mental Toughness Instrument (3RMTI)

Updated Summary Findings

The background and concept of "mental toughness" was described in last year's annual report. Our preliminary mental toughness measurement model consisted of three proposed dimensions (ready, right now, resilience), represented by 15 items.

Since last year we have obtained two additional (non-military) samples. Model refinement based on analyses and re-analysis of the first two 3RMTI samples has resulted in a 12-item measurement model (one item removed from each dimension of the preliminary model). This new model was specifically tested with a third (new) sample of rock climbers.

We will likely rename the 3rd dimension to "response" instead of "resilience" so as not to confuse with a traditional "bounce back" operationalization of the resilience construct. The items in the 3RMTI scale more closely resemble growth-minded response to adversity, than a return to prior adversity state, so the re-labeling seems a more valid representation of the concept, and will help distinguish the 3RMTI instrument from scales designed to purely assess resilience.

We are finally (as of October 2016) currently collection new 3RMTI data from U.S. Army personnel via the renewed collaboration with CSF2; but do not yet have a sufficient sample size to conduct psychometric analyses.

Although not presented here, it should also be noted that both new samples of 3RMTI data were subject to basic measurement invariance analysis across gender (male vs. female) and were found to be sufficiently invariant to use for substantive comparisons. Additional measurement invariance analyses are underway.

Exploratory Factor Analysis of 12-item Scale

N=490 complete cases from EWU

Pattern Matrix[a]

	Component		
	1	2	3
RESIL_3	.808		
RESIL_5	.749		
RESIL_4	.742		
RESIL_1	.648		
READI_1		.774	
READI_3		.715	
READI_5		.715	
READI_2		.638	
RNOW_1			.824
RNOW_5			.751
RNOW_3			.738
RNOW_4			.626

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 9 iterations.

Pattern Matrix[a]

	Factor		
	1	2	3
RESIL_3	.783		
RESIL_5	.607		
RESIL_4	.598		
RESIL_1	.551		
READI_3		.670	
READI_1		.608	
READI_5		.579	
READI_2		.522	
RNOW_1			.719
RNOW_5			.642
RNOW_3			.631
RNOW_4			.521

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 8 iterations.

N=718 complete cases from UI ED587

Pattern Matrix[a]

	Component		
	1	2	3
RNOW_1	.791		
RNOW_5	.766		
RNOW_4	.761		
RNOW_3	.729		
READI_5		.792	
READI_3		.730	
READI_2		.710	
READI_1		.613	
RESIL_3			-.789
RESIL_4			-.756
RESIL_5			-.690
RESIL_1			-.582

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 10 iterations.

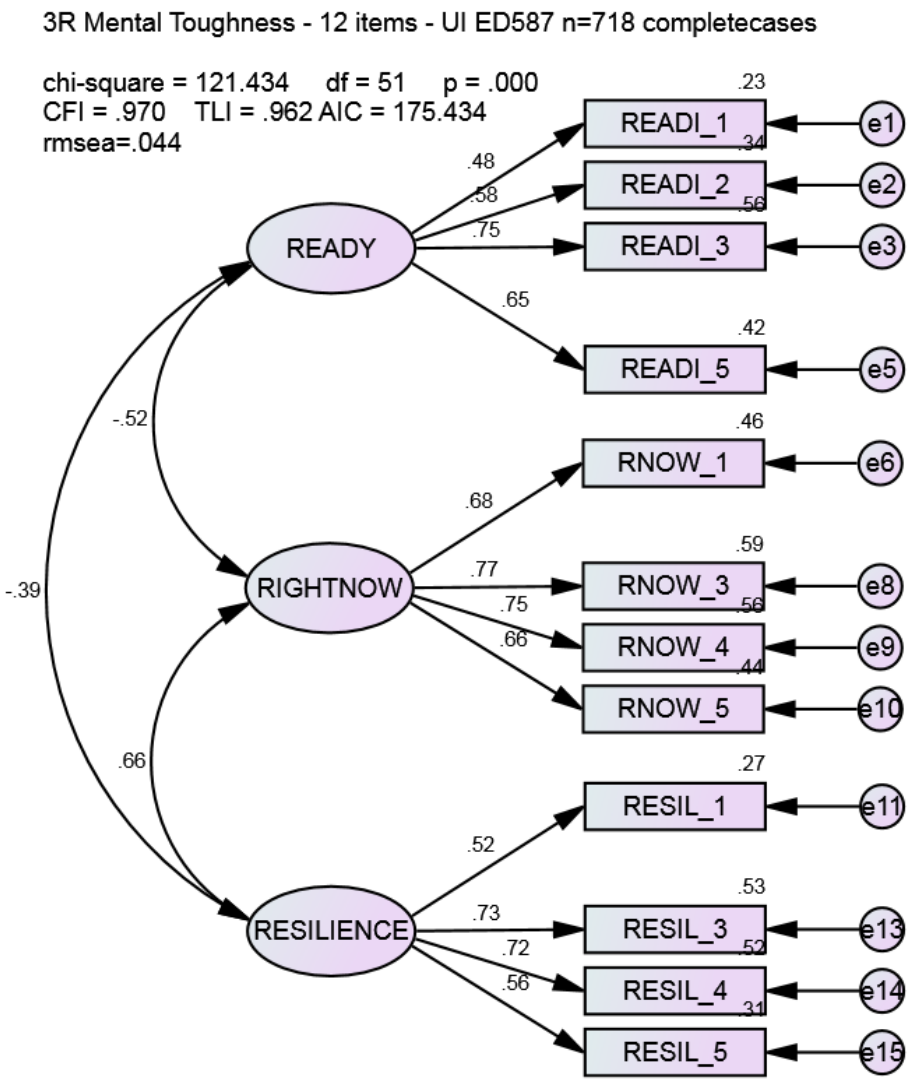
Pattern Matrix[a]

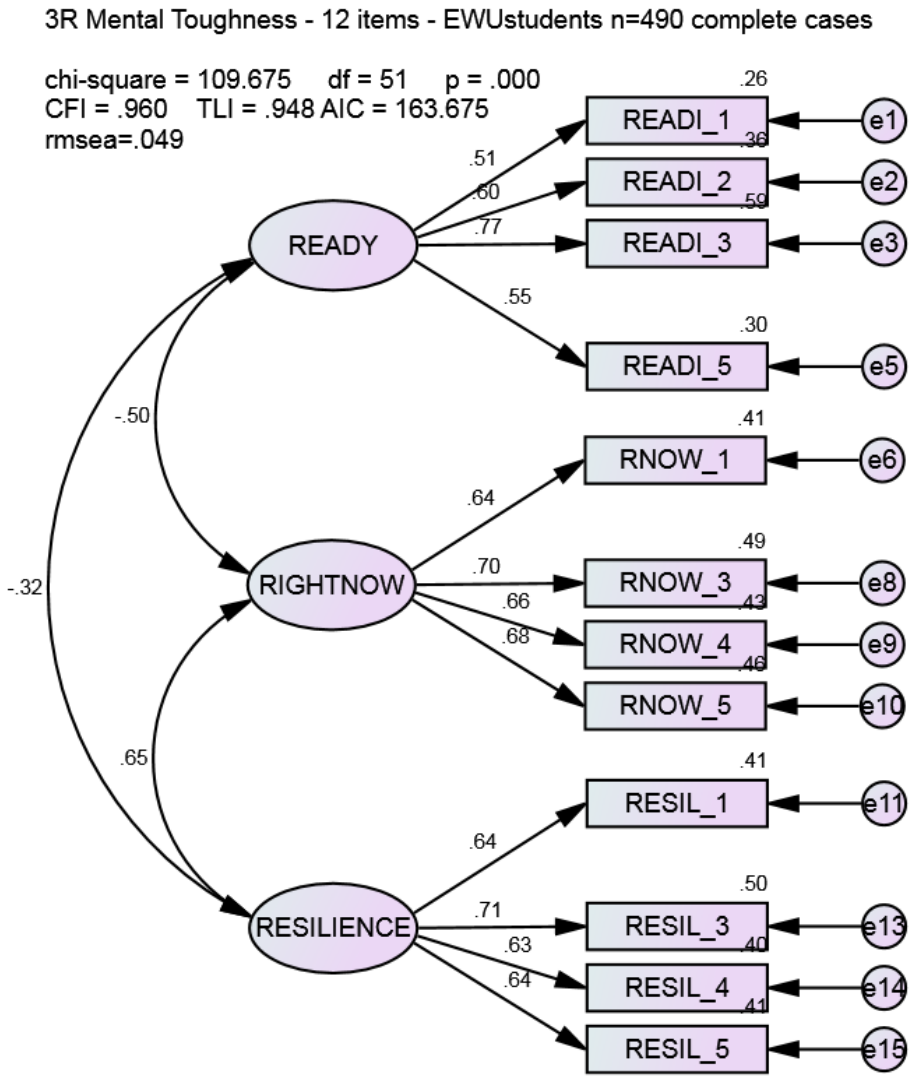
	Factor		
	1	2	3
RESIL_3	.781		
RESIL_4	.646		
RESIL_5	.513		
RESIL_1	.442		
READI_5		.701	
READI_3		.686	
READI_2		.568	
READI_1		.441	
RNOW_4			.710
RNOW_1			.686
RNOW_3			.667
RNOW_5			.665

Extraction Method: Maximum Likelihood.
Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 10 iterations.

Measurement Model Diagram of 12-item Scale




3R Mental Toughness - 12 items - EWUstudents n=490 complete cases
chi-square = 109.675 df = 51 p = .000
CFI = .960 TLI = .948 AIC = 163.675
rmsea=.049
READY
RIGHTNOW
RESILIENCE
READI_1
READI_2
READI_3
READI_5
RNOW_1
RNOW_3
RNOW_4
RNOW_5
RESIL_1
RESIL_3
RESIL_4
RESIL_5
.51
.60
.77
.55
.64
.70
.66
.68
.64
.71
.63
.64
-.50
-.32
.65
.26
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.30
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.49
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.41
.50
.40
.41
e1
e2
e3
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e10
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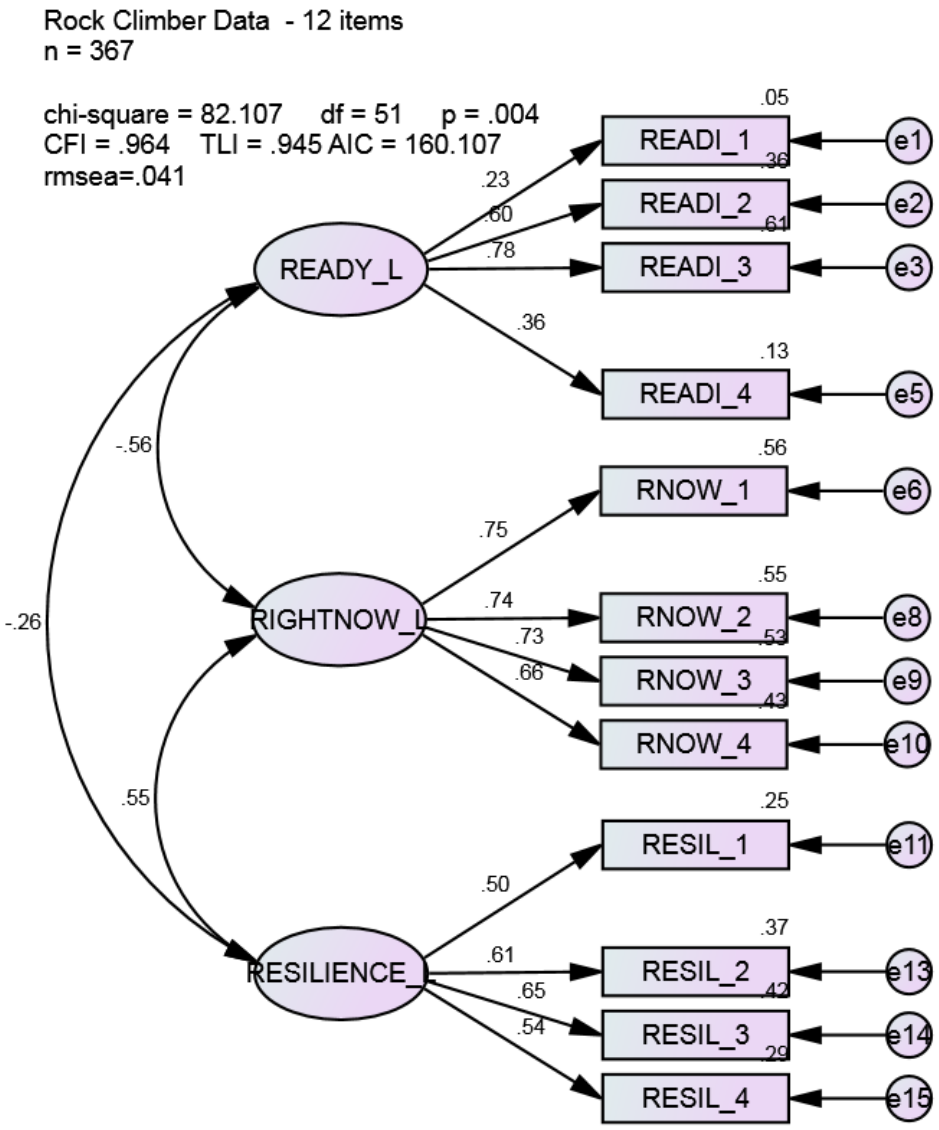
e13
e14
e15


Rock Climber Data - 12 items
n = 367
chi-square = 82.107 df = 51 p = .004
CFI = .964 TLI = .945 AIC = 160.107
rmsea=.041
READY_L
RIGHTNOW_L
RESILIENCE_
READI_1
READI_2
READI_3
READI_4
RNOW_1
RNOW_2
RNOW_3
RNOW_4
RESIL_1
RESIL_2
RESIL_3
RESIL_4
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.73
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-.56
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.05
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.13
.56
.55
.53
.43
.25
.37
.42
.29

Mental Toughness – Twelve Retained Items

(Note: The item number below reflect new item numbering; but do not match with the original questionnaire item numbers shown in the first two CFA diagrams on the previous pages. The item numbers do match those of the rock climber sample, and the Army sample currently being obtained via CSF2. The content of the items is identical.)

Anticipation of Adversity Dimension (Ready)

1. I avoid situations I expect will go poorly.
4. When I anticipate adversity I become easily distracted.
7. When I expect things to go wrong, I start to panic.
10. The possibility of failure scares me.

During Adversity Dimension (Right Now)

2. When the going gets tough, I think more clearly.
5. Performing under pressure brings out the best in me.
8. During a crisis, I execute tasks even better.
11. Stress improves my focus on the task at hand.

Post Adversity Dimension (Response)

3. After difficult events, I perform better in the future.
6. I respond after failure by working at getting better.
9. Adversity teaches me how to improve.
12. After things go poorly, I attend to what matters most.

Appendix C. – Brief Resilience Scale (Smith et al, 2008) Additional Psychometric Analysis

Summary Findings

At the 2016 IPR meeting Dr. Amy Adler recommended we consider the Brief Resilience Scale (BRS: Smith et al, 2008) as an additional possible tool for assessing resilience. She also provided the item covariance matrix so that we could do preliminary psychometric testing prior to obtaining sufficient data through CSF2.

The authors of the scale have suggested a single resilience dimension. At least one published study (Tansey et al, 2016) has suggested that the BRS consists of two sub-dimensions (resilience and succumbing). Because the scale uses alternating valence for items, and the opposing valence distinguishes the two potential sub-dimensions, it is not obvious if it is best considered a single scale with measurement artifact due to wording, or if the dimensions are substantively different.

Our initial psychometric efforts also support a two-dimensional model similar to Tansey at al. Moreover, it appears a second-order measurement model provides a potential fit to both psychometric and substantive considerations. We will further test this concept with new data from CSF2 once our sample is sufficiently large.

BRS Six Items

BRS1: I tend to bounce back quickly after hard times.

BRS2: I have a hard time making it through stressful events.

BRS3: It does not take me long to recover from a stressful event.

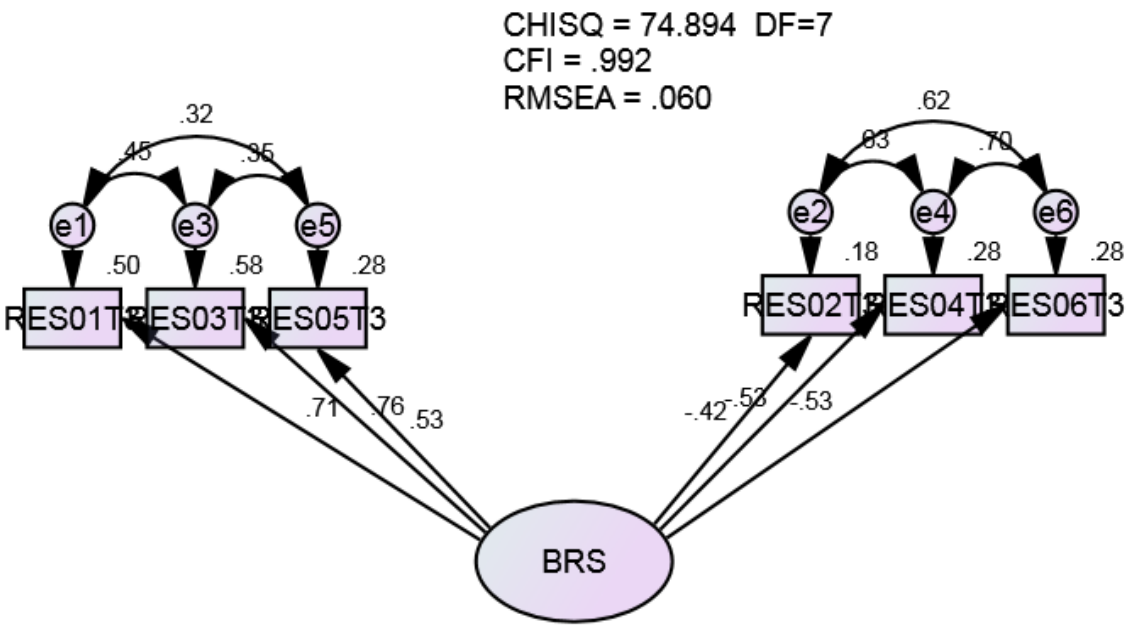
BRS4: It is hard for me to snap back when something bad happens.

BRS5: I usually come through difficult times with little trouble.

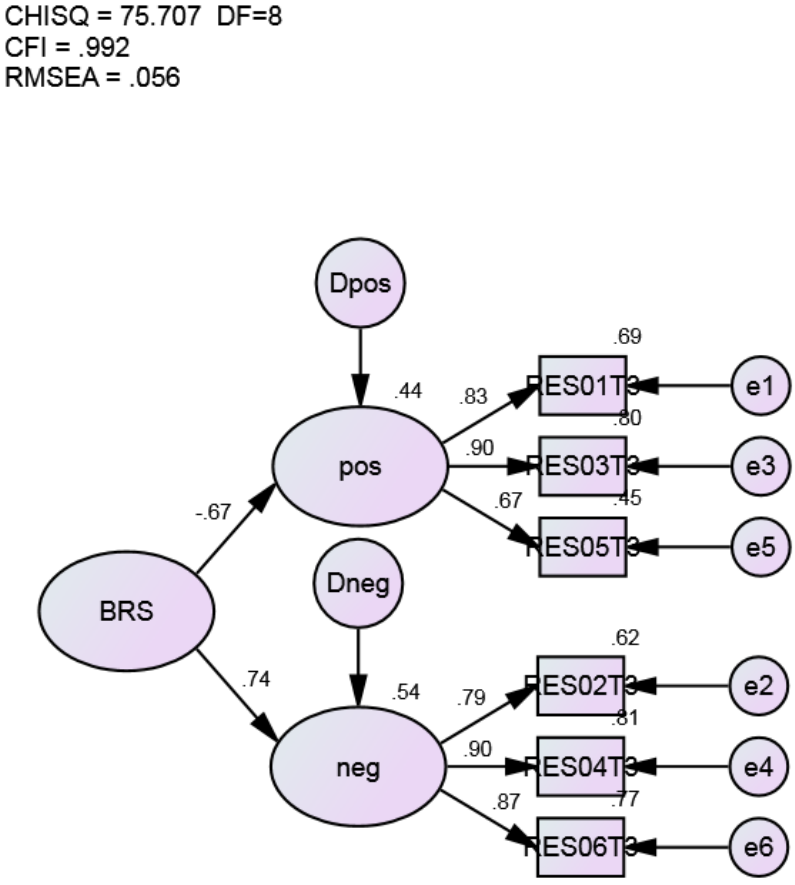
BRS6: I tend to take a long time to get over set-backs in life.

BRS Measurement Models

Two-dimensions with error-covariance measurement artifact



2nd order measurement model



Appendix D. – Data Sources

Data Sources used to examine preliminary measurement models

Measurement Study Phase I (Pickering et al)	n = 1670, 1704
Combat Life-saver Study (Metzler et al)	n = 1210
Mental Fitness Study (Adler et al)	n = 2466
Army Stryker Study (McGraw, et al)	n = 427
USMA Cadet Combat Study (Jensen & Pickering)	n = 430
ACEP WTU Program Evaluation WTU (Holliday & Harada)	n = 869
EWU Student Adversity Study (Pickering et al)	n = 425
UI Mental Toughness Project (Pickering et al)	n = 718
UI Rock Climber Project (Nelson et al)	n = 367
Adler et al. BRS item covariance matrix	n=2738